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Use and Management of Medicinal Trees and Shrubs and Associated Indigenous Knowledge of Warra Dube People, Bale Zone, South-Eastern Ethiopia

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Abstract

Plants are indispensable sources of both preventive and curative in preparations of alternative medicine for human and livestock diseases. The aim of this study was to investigate the use and management of medicinal trees and shrubs (TSs) and the indigenous knowledge (IK) of Warra Dube people in Bale Zone of Ethiopia to treat human and animal health problems. For this study Warra Dube communities in Gassera, Gololcha, and Ginnir Districts of Bale Zone were involved. The vegetation type of the study area is categorized under dry ever green mountain forests. Data was collected using semi-structured interviews, field observation and focus group discussions. Alternative healers were selected by snow ball method. Explorative survey study design was used to explore and document medicinal TSs and associated IK of the traditional healers in the area. Data collected was analyzed using descriptive statistics. A total of 39 species of medicinal TSs belonging to 25 different families were documented. All these are used for the treatment of human and livestock diseases. Of these, 29 species (74.4%) were used for treatment of human diseases, 6 (15.4%) were used to treat livestock diseases and the remaining 4 species (10.2%) for treating both human and livestock diseases. The results of growth form analysis of the reported medicinal species reveals that 11 species were trees and 28 were shrubs. The dominance of shrubs is due to the fact that agro-ecology of the area is low land. The result in the conditions of TSs parts used indicated that about 55.2% were used in fresh form and 34.5% in dried forms and the remaining 10.3% in either fresh or dry forms of preparation. Fifty eight different diseases were recorded as human health problems that are commonly treated by these 39 TSs species. These medicinal TSs are under severe threat due to over utilization by the local communities, hence, awareness creation and development of conservation practices is important.

Keywords: Alternative healers; Bale zone; Conservation; Indigenous knowledge; Medicinal trees shrubs; Warra dube people

Introduction

Since ancient times, plants have been indispensable sources of both preventive and curative in traditional medicine preparations for human beings and livestock. Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in China and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians [1]. Considerable indigenous knowledge system, from the earliest times, is linked to the use of traditional medicine in different countries [2]. Evidence obtained from observations of animals shows that even chimpanzees use a number of plant species for their medicinal value [3]. Traditional medicine comprises therapeutic practices in existence for hundreds of years before the development of modern scientific medicine and is still in use today without much documented evidence of adverse effects [4]. In Ethiopia, the use of traditional medicine is widely practiced. Ethiopia is the land of vegetation as well as livestock. The size of the Ethiopian flora is estimated at 6,000 taxa of vascular plants of which about 10% are believed to be endemic [5]. Of these, about 1000 species of plants are used in the traditional health care system to treat nearly 300 mental and physical disorders (Unpublished database of National Herbarium). According to Abebe D, alternative remedies are the most important and sometimes the only source of therapeutics for nearly 80% of the population and 95% of traditional medicinal preparation in Ethiopia is of plant origin [6]. Ethnoveterinary medicine refers to traditional animal health care knowledge and practices comprising of traditional surgical and manipulative techniques traditional immunization, magic religious practices and beliefs, management practices and the use of herbal remedies to prevent and to treat a range of disease problems encountered by livestock holders [7]. The knowledge of medicinal plants is normally passed orally from one generation to the next. Traditionally, herbalists usually passed on their knowledge only to their first born sons or to other trustworthy person and such a knowledge is normally transmitted when the father is getting old or just about to die. The son or other person inheriting the knowledge will normally take an oath not to reveal the secrets to anybody else. Instructions are generally given in the field, where the son is shown the plant, told the vernacular name, and told how to prepare the drug from the plant or plant part for a specific disease [8].

There is a limitation of research on sustainable utilization of medicinal plants in Ethiopia [9,10]. Limited numbers of professionals have made an attempt to document the medicinal plants and traditional knowledge in some parts of Ethiopia; in fact, there is a need to do more in parts where such studies have not been conducted due to the cultural diversity and the diverse flora of Ethiopia. Like other

places in Ethiopia, Warra Dube people have a wealth of knowledge regarding use and management of alternative medicines which they accumulated for generations. The elders, who know more about medicinal plants, may die without sharing their traditional knowledge to the young generation. Since the knowledge of traditional medicine is transferred orally from generation to generation, basic information may be lost. Basic information that could be lost by oral transfer includes how to prepare the drug, disease treated by medicinal plants, part used and other important information may be discarded. Therefore, exploration and documentation of medicinal plants and the knowledge associated with them are important.

Until this time, research on use and management of medicinal trees and shrubs (TSs) and associated indigenous knowledge of Warra Dube people is undocumented. Moreover, the alternative medicinal knowledge is gradually disappearing among the communities due to socio-cultural and attitudinal changes of young generation. Indeed, there is a need to conduct a research that contributes to the understanding of indigenous knowledge (IK) and the development of programs on how to utilize the knowledge for the future. Therefore, this study was initiated to explore and document medicinal TSs and the associated IK of Warra Dube People in Bale Zone, Southeastern Ethiopia. The importance of the present study was to provide base line information on the IK of Warra Dube people on the use of medicinal TSs, parts used, diseases treated in humans and veterinary cases, preparation methods, threats to medicinal TSs and conservation practices in the area. Moreover, the documentation of the IK on medicinal TSs can be part of the information source for those who want to conduct a further research in this aspect and the development of modern drugs. At same time, this study is also believed to add up to the country's database of medicinal TSs.

Materials and Methods

The study area

The study was conducted at Wabe River gorge with Warra Dube people living in the southern part of upper Wabe Valley on both sides of the river bank following the river flow. These people are located in the geographic area which ranges between 39°20' 0"- 40°50'0"E and 7°10' 0"- 8°0'0"N. Wabe River Basin occupies southeastern drainage system of the Horn of Africa.

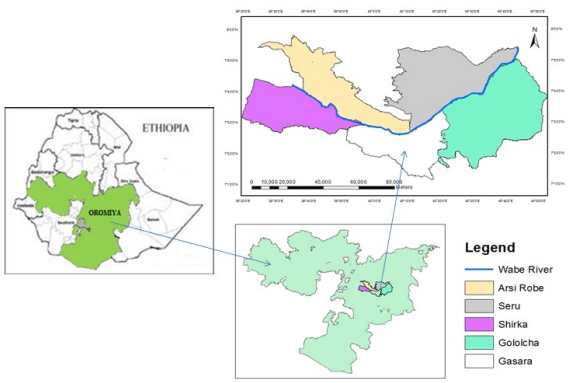

Figure 1: Location of Warra Dube people living in the southern part of upper Wabe Valley on both sides of the river bank.

Wabe River flow northeast wards cutting eventually deep gorge between Arsi-Bale massif, from its source near Kokosa and Kofale Districts, making boundary between the previous provinces of the Arsi and Bale. The territory of Warra Dube communities stretch between Agarfa and Shirka Districts in the Northwest to Seru and Gololcha Districts in the southeast up to adjoining of western Hararghe Zone along Wabe River Bank (Figure 1). For this study, Warra Dube communities in Gassera, Gololcha and Ginir Districts of Bale Zone were involved. The vegetation type of the study area is categorized under dry ever green montane forests. The word "Warra Dube" means Dube family. 'Dube' is the name of their local language. Whenever Warra Dube people speak Dube language, it is similar with Somali language which is classified as a dialect of the central Cushitic languages along with Afan Oromo, Afar, Kambata, and others except difference in accent. The difference in accent between Dube and Somali languages is due to two main reasons: the difference in social background of the speakers and gradual modification of Somali language by these people as they were departed from people of Somali Region since the start of 19th century (Personal communication). Currently Dube language uses no any script. Though the people are locally communicating by Dube language, the language for their educational system is Afan Oromo. Since health extension and education was started very recent time at this specific area, Warra Dube people are still following traditional way of life.

Sampling techniques

Preliminary survey of the study area was conducted in March, 2016 specifically from March 21-25, 2016. During this survey, information about the physical features of the study area was collected. Ethnobotanical data were collected using purposive sampling. This sampling technique was preferred because the study focuses on specific issues that it was gathered from the most knowledgeable representatives of the society. Alternative healers were selected by snow ball method. Since the purpose of this study is to explore and document medicinal TSs and associated IK of the traditional healers in the area, sample size depends on the availability of healers in the area and hence explorative survey study design was used. A total of 41alternative healers were interviewed. The choice of these healers is following the suggestion made by Martin and Cotton [11,12]. In this study, alternative healer's aged 25 and above were included which is nearly similar with other areas, for example, it is 23-77 years in Chifra District, Afar Region [13] and 51-70 years in Konso. According to the culture of Warra Dube People, since women are not involved in traditional medicine preparation, all the respondents were male.

Methods of data collection

For data collection were semi-structured interviews, field observation and focus group discussion During the interview, local name of medicinal TSs, part used, disease treated, methods of preparation, route of administration, application techniques, uses other than medicinal uses, threats to medicinal plants, effectiveness of the drug, how alternative medicinal knowledge transfer and conservation methods were recorded. Field observations were performed with the help of local guides as well as interviewees in the study area. The status, habit, habitat and characteristics of the TSs were also recorded on site. All medicinal TSs encountered during this inventory and reported by alternative healers were collected and recorded using Dube, Afan Oromo and Amharic languages. Further, species identification was made using useful trees and shrubs for

Ethiopia [14] and the published modern Flora of Ethiopia and Eritrea [5].

Data analysis

The collected quantitative data were analyzed using descriptive statistics like frequency distribution and percentage by using Microsoft Excel [10,15] while qualitative data was analyzed thematically and narrated in text.

Results and Discussion

Medicinal trees and shrubs of the study area

A total of 39 species of medicinal TSs belonging to 25 different families were documented. All these are used for the treatment of human and livestock diseases. Of these, 29 species (74.4%) were used for treatment of human diseases, 6 (15.4%) were used to treat livestock diseases and the remaining 4 species (10.2%) for treating both human and livestock diseases. The main features of each medicinal TS and its medicinal uses in the study area. Most of the medicinal TSs collected and identified in this study were also medicinally used in other parts of Ethiopia. Of the 39 medicinal TSs collected in this study, 2 of them were already reported by Tamene B, et al. from Cheffa plain of South Welo, 4 of them by Mirutse Giday by the Zay people, 6 of them [13] from Chifra District of Afar region, 16 of them were indicated [6] from Southern Ethiopia. Other studies have reported the medicinal uses of these species [9,10,13,16-20]. Hence, 24 (57.1%) of these species were reported by others previously. Such widespread report on the use of these TSs by different groups of societies from different localities could be attributed to different cultural groups, which could validate the medicinal properties of these species. So, people of Ethiopia over wide area have the tendency to use the same medicinal species as a result of the wider distribution of medicinal TSs in the country and to a certain extent their usefulness.

Growth forms (habits) of medicinal TSs

The results of growth form analysis of the reported medicinal species reveals that 11 species (28.2%) were trees and 28 (71.8%) were shrubs. The dominance of shrubs is due to the fact that agro-ecology of the area is low land.

Preparation of medicinal TSs

The result in the conditions of TSs parts used during preparation indicated that about 56.4% were used in fresh form and 33.3% in dried forms and the remaining 10.3% in either fresh or dry forms of preparation (Figure 2). Using of fresh materials has thrown the species to serious threat than the dried forms, which can be stored for longer period of time. However, preservation of remedies was not reported by informants of the study area since the remedies were used mainly in their fresh forms. This finding is consistent with other findings in Ethiopia [15,16,18] who reported that the majority of the remedy preparations were in fresh form.

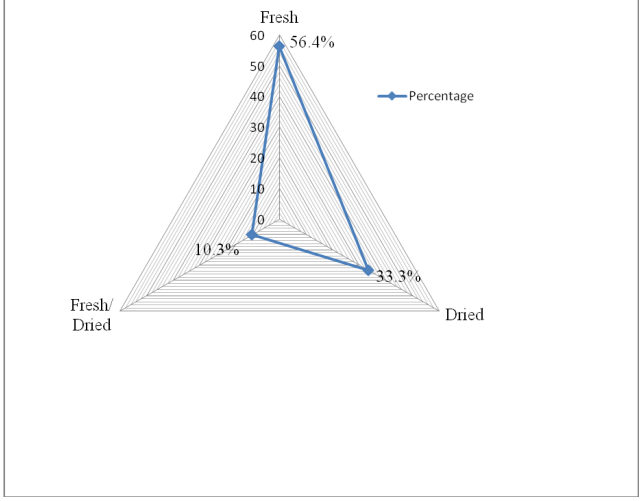

Figure 2: Habit of TSs used for preparation of medicine (Source: Field Survey, 2016).

Human diseases and medicinal TSs used to treat them

Fifty eight different diseases were recorded as human health problems that are treated by about 39 TSs species, i.e. one species can treat a single disease or a number of diseases. The traditional healers in the area commonly diagnose each health problem by an interview and visual inspection of the patient. According to the informants the largest numbers of species were used to treat stomachache, which is particularly treated with 6 species. This disease is common in the area, and most of the sample informants and some key informant asserted that this may be due to poor/ unclean drinking water in the area. The next are wound, fractured bones, toothache and urinary problems for both human beings and their livestock. Moreover, the healers were also visited for diseases like evil eye, common cold, diarrhea, cancer and others health problems. Local communities prefer alternative medicine for such diseases rather than modern medicine.

Parts of medicinal TSs used to treat human diseases

With regard to the parts used for medicinal purposes, different parts of the TSs were reported to be used for medicine preparation. In this study the most utilized TSs part reported was roots (41.4%), followed by leaf (25.9%), barks and latex (6.9%) each (Figures 3 and 4).

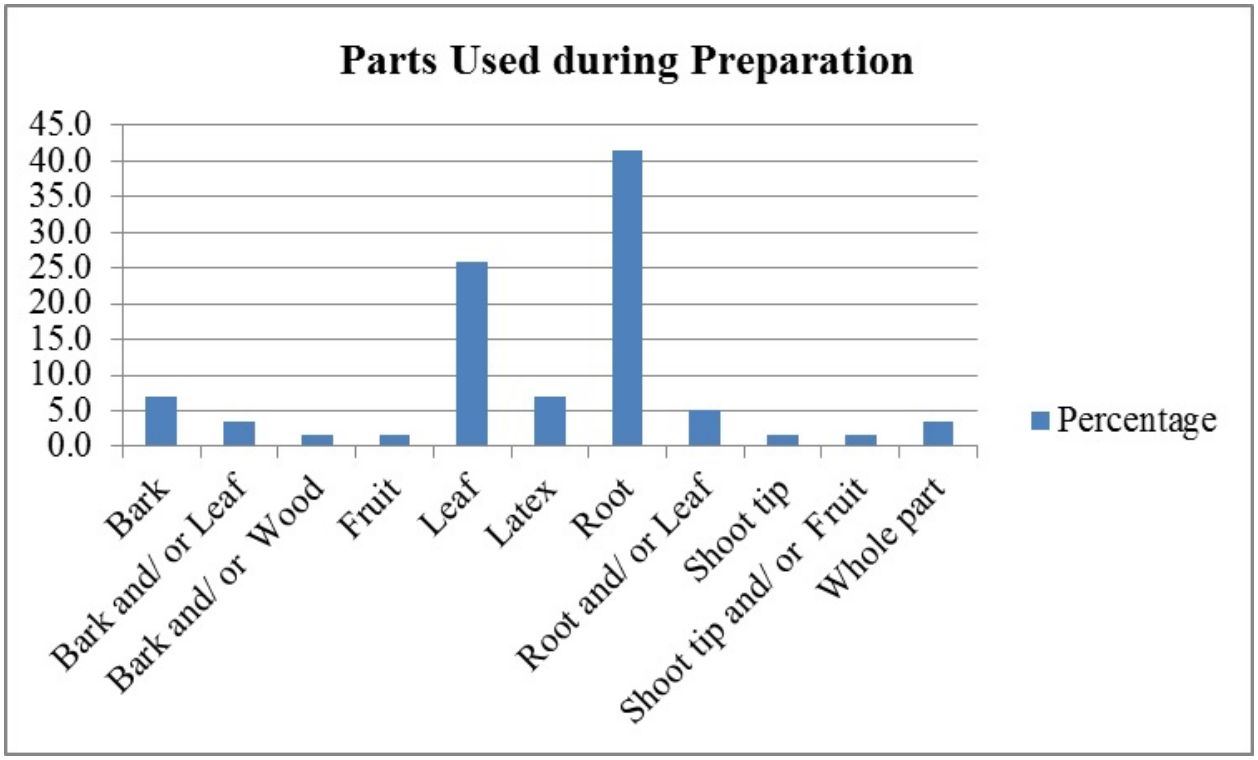

Figure 3: Part (s) of medicinal TSs used for preparation of medicine (Source: Field Survey, 2016).

Figure 4: Identification of parts of medicinal trees and shrubs (A), spiny stem (B), cut fresh bark (C) and fruit and leaves (D) of *Capparis tomertosa* Lam.; locally called Harangamgab.

This finding is in line with the results of other ethnomedicinal study [21] where roots take the lead but inconsistent with others [15,17,18,21-23] which reported that leaves were the most commonly used plant parts used in remedy preparations.

Preparation, routes of administration and application of human medicine

Concerning the preparation of medicine for humans, the healers employ various methods of preparation of traditional medicine for different types of diseases (Figure 5).

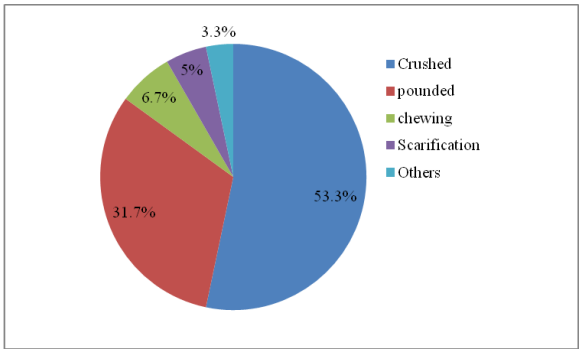

Figure 5: Preparation methods of human medicinal TSs (Source: Field Survey, 2016).

The healers have various skills associated with remedy preparation. Medicinal TSs are applied through different routes of administration. The prepared traditional medicine are applied in a number of ways,

oral application accounts for the largest (52%) followed by dermal application (41%) and nasal application (7%). Internal diseases were commonly treated by making the patient drink the prepared medicine and/or through eating harvested fruits. Similar results were obtained by other investigators [15-18,20-23] that indicated oral administration is dominant over others routes of administration.

As in various parts of Ethiopia, the knowledge and use of traditional healers on measurement of optimum dosage to treat various diseases is not standardized. The traditional healers use different measuring materials like coffee cup, tea cup and glass for those remedies which are taken orally. But, these measurements and may be concentration of the ingredients vary in different circumstances for the same type of disease. Also, for medicinal TAS that are eaten and chewed they do not have precise dosage. The lack of precision and standardization as one drawback for the recognition of the traditional healthcare systems. The measurements used to determine the dosages are not standardized and doses given depend on the age, physical appearances and heath conditions. Though such prescription difference was practiced, still the amount prescribed by healers for both children and adults might not conform to the standard prescriptions as in modern medical health care systems. To see the perception of informants on the dosage used, they were asked "Are there negative consequences after the use of traditional medicine?" and 90% of the informants asserted 'No' negative consequences were recognized after usage and the remaining proportion 10% responded that it was difficult for them to recognize the consequences as it may have some effects in the long run. Traditional healers keep secret about medicinal TSs. There is strong belief that traditional medicines lose their healing capacity if non-healers know them. They also claim that in order to increase the efficacy of the drug; incentives should be given which if not; the drug loses its healing power. There is also a belief on medicinal TSs collection time, storage and time of administration. For instance, people of the study area believe medicinal TSs collected early in the morning before working anything have high efficacy. Even patients prefer to visit local healers (traditional medicine) than modern medicine or use traditional medicine after failure of modern drug. The same results that local people have been seeking for traditional healers' treatment even in preference to modern medications [10,22]. Local people of the study area prefer traditional medicines than modern drugs to get relief from evil eye, liver problem and sexual impotency in male. In general, about 87.5% of informants reported that traditional medicines are effective for treatment of human and livestock diseases [24].

Source of traditional medicinal knowledge

Among people of the study area, traditional medicinal knowledge was mainly gained from parents (62%), followed by from other healers (15%) and self-trial and error (13%). This finding agrees with other investigations in other parts of Ethiopia [17,18] that reveal the highest source of traditional medicinal knowledge was from parents. The traditional healers of the study area showed a strong tendency to keep their knowledge secret. It was explained by respondents that local healers do this in order not to let the other community members know the identity of the medicinal plants healers are using. Traditional healers suspect that if somebody else might see them while they are preparing the medicine from the plants and start to prepare them and reduce the income which could have gone to the healer.

Threats to medicinal TSs

The main threats to medicinal plants around Warra Dube people was due to charcoal production, free grazing , cutting firewood. For example, Kuuloo (*Balanites aegyptiaca*) affected for tooth brush harvest. People need TSs in their daily life. During semi-structured interview with healers various factors were recorded as the main threats to medicinal TSs in the area. The habitats of these valuable TSs were increasingly threatened by continued destruction of the vegetation. The fact that most of these TSs have multipurpose uses posed a big threat to their existence due to destruction of their habitats. Moreover, healers and elderly people indicated that during heavy rainfall, Wabe river flow over and it damages the nearby vegetation.

Conservation of medicinal TSs

People of the study area know the benefits of conserving medicinal plants. However, the effort of conserving medicinal plants is minimal. Since Warra Dube people, by culture, are living in very small huts, cutting trees is not commonly known in the area. During the guided field walk, it was observed that many informants were planting many trees and other perennials on whatever land they own. It was also observed that there are some culture and spiritual beliefs that somehow helped in the conservation of medicinal TSs. For instance, the claim of the traditional healers that *"Medicinal TSs are effective only if cut or collected and administered by healers"* helps in conservation of medicinal plants. It was also reported that collecting TSs on Friday, Sunday and during moon time at night for medicinal purpose is much prohibited.

Management of medicinal TSs

Warra Dube people, distinctive community, living in Gassera District, Bale Zone, Oromia Regional state have peculiar habituation and they are well known for their healing abilities and dependent on husbandry way of life. Their livelihood is completely reliant on the existence of medicinal plants as a means of securing the necessities of life. As the preference of Wara Dube people is limited in living along the narrow Web River basin alone, they have their own unique way of conserving and managing medicinal plants existing around their particular area.

Zoning the medicinal plant of their interest at key areas within the Park or in their distinguished natural habitats on basis of particular characteristics of that plant. They are limited to use this method of conservation and management, if the plant is believed to be valueless when it is taken to home. Here the plant is believed as a medicine when it stays at its natural habitat only. So they conserve and manage such medicinal plant at their natural habitat. This is the most known kind of management practice to conserve medicinal plants by Wara Dube people.

Warra Dube people have also another kind of management practice to conserve medicinal plants in the form of live fence. They bring the plants from their natural habitat and transplant it around their house.

They also manage medicinal plants in home garden along with common vegetables.

Conclusion

On the basis of the results of the study, it has been concluded that 39 medicinal TSs were recorded, of these 29 species were noted to treat only human diseases, 6 to treat only livestock diseases, and 4 species are used to treat both human and livestock diseases. These medicinal TSs are used only for self-medication and domestic use. The medicinal TSs species collected and identified were mostly obtained from river banks and shrub lands. In the study area, 41different types of diseases were reported (31 human diseases and 10 livestock diseases) as being treated by traditional medicinal TSs. Overall growth form analyses indicated that shrubs were found the dominant growth forms used for preparation of traditional remedies followed by trees. Roots were also found to be the most frequently used TSs parts for alternative medicine preparations. Alternative medicine preparations mostly involve single TSs; the mode of administration is mainly internal in which oral administration is the common route. The main threat to medicinal TSs in the area arises from firewood collection. Threat to medicinal TSs due to the utilization of them as medicinal purpose is negligible. However, threats that erode IK emanate from secrecy, oral based knowledge transfer i.e., absence of documented sources of this knowledge, reluctance of young generation to gain the knowledge, disappearance of the species and lack of awareness are the major threat to the loss of medicinal plants in the area.

Recommendations

Based on the research results the following recommendations are forwarded:

Local people of the area harvest TSs for different uses such as firewood and other purposes for source of income or for household use with little awareness of its threat or lacking other alternatives means; hence, public awareness and community based management need to be encouraged to save the loss of medicinal species.

Since some of the traditional healers might have given much attention to the IK transfer while others have little concern regarding the value of indigenous knowledge, there is a need for governmental and nongovernmental organizations to participate in awareness raising for healers to minimize the loss of IK.

The government must encourage and even pay money for alternative healers to exploit their IK; otherwise their 'patent right' must be kept secured. This may pave a way to explore many inputs for modern science and technology from such IK.

The IK of alternative medicine healers must be encouraged and protected. This could be the way through which such people could exercise their skill broadly, and benefit from it. There is a need for coordination of traditional healers of the area together by certification or by organizing them at District level to popularize their indigenous knowledge, IK, on medicinal TSs. Establishing Traditional Healers Association by providing land for cultivating medicinal plants, funds and assisting their activities with professional guidance helps to conserve the fast eroding medicinal TSs of the area.

The overall analysis reveals that major uses of medicinal TSs for treatment of different diseases ranges from simple diseases to fatal diseases. These traditional remedies need to be confirmed through scientific investigations to identify those that may provide alternatives for modern drugs.

Encouraging people to grow medicinal plants in home gardens, mixing with crop lands and live fences.

Encouraging people to protect and enclose ritual and spiritual areas with higher distribution of medicinal TSs in the locality.

Biological studies should also be conducted on the reported medicinal TSs of the study area to generate information that could be used in future drug development and possibilities to improve them through breeding.

Moreover, the documented medicinal plants can serve as a basis for future investigation of modern drug.

Competing Interest

The authors declare that there is no any sense of conflict of interest.

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